Crystal Structure of the Olfactory Marker Protein (OMP_

P. Smith and J. Hunt (Columbia U.)

Abstract No. Smit7397
Beamline(s): **X12C, X12B**

Olfactory Marker Protein (OMP) is a highly expressed and strongly phylogenetically conserved cytoplasmic protein of unknown function found almost exclusively in mature nasal sensory neurons. Through knockout phenotype studies in mice, OMP has been shown to participate in the olfactory signal transduction process to the extent that mice lacking OMP can not recover from odorant stimulation or respond to repeated olfactory stimulation as readily as wild-type mice. Although total olfactory discriminatory ability is largely unaffected in these mice, electrophysiological studies show dramatic alterations in sensory signal patterns in the knock-out phenotype. In hopes of elucidating the exact role OMP has in the olfactory signal transduction pathway, we solved the crystal structure of murine OMP using MAD techniques to a resolution of 2.35 angstroms. The structure is of the beta-clamshell type with eight antiparallel beta strands forming the predominant structural motif of the protein. The structure bears moderate three-dimensional similarity to a large family of viral capsid proteins, which share a similar beta clamshell fold but are lacking any significant sequence homology to OMP. Although the nature of OMP's effect on signal transduction suggests it is involved in some type of small molecule binding, the surface of the protein is mostly convex and devoid of any obvious small molecule binding sites. Fluorescence studies have likewise shown no clear interaction between OMP and a variety of potential ligands such as IP3, cAMP, and divalent cations. However, close analysis of the structure reveals both a possible protein-protein interaction site and a loop region with marked potential for undergoing a conformational change.